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HEREDITY AND MEMORY. By James Ward, Sc.D. Cambridge: The University Press, 1913. Pp. 56.

The mnemonic or psychological theory of heredity has the fascination belonging to all explanations which say that something apparently mysterious is really a case of something so familiar that we never feel it to be mysterious; once an illumination of this kind has burst upon the human mind, there seems no limit to the amount of paradox we can swallow. When Samuel Butler, that *mauvais sujet* of science, caught up Hering's memory theory as a stick to beat Darwin, and showed us, with all the charm of his wit, the chick pecking its way through the shell because it remembered the lessons accumulated by millions of ancestors in the course of evolution, we joined in the sport and almost felt that there might be 'something in it'; but in the heavier hands of Professor Ward the fun falls rather flat.

The theory is roughly as follows. In acquiring some accomplishment,—say playing the piano,—I begin by moving my fingers in the proper way by the help of memory. With practice, intellectual effort ceases, and the desired movements become 'secondary automatic,' my accomplishment becoming more perfect, the greater the rôle played by reflex action and the less the rôle played by conscious direction. In fact we cannot be said really to know how to do something until we can do it without thinking. Everyone knows how 'function perfects structure' in this way, constant repetition creating a system of nervous and muscular machinery which works of itself. And everyone knows how necessary the formation of such habits is to a man's successful development. Why not, then, regard the production of a successful species as taking place in the same kind of way as the production of a successful individual? The relation of inheritance which holds between descendants and ancestors will then appear in a new and intelligible light: it will be the same as the relation between the later and earlier phases of an individual. The many repetitions required before I can build up, on the basis of habit, the structure which will enable me to play the piano, have their analogue in the infinite repetitions necessary to the development of a new organ in the course of evolution; and the precision with which I can play the piano, once the habit is formed, is represented by the rapidity of embryonic

growth, the cell which grows into an animal traversing in a short time nearly all the stages of life from the highest to the lowest. The cell is able to go, in a few months, through a process which, in the case of the race, required æons of geological time, because, with the perfection that comes with habit and habit alone, it remembers how to do it. Such is the mnemic theory of heredity. Its attraction is that it seems to offer a way of escape from that drab mechanical view which would account for the development of the higher forms of life by natural selection working on chance variation, and that it implies a conscious purpose in evolution.

On the other hand, it has one great drawback: it implies that acquired characters are to some extent transmitted; and this, as Professor Ward admits, 'the majority of biologists' now deny. He urges, indeed, reasons why we should not accept this verdict as final, but it is to be observed that his contention, even if correct, does not by itself afford evidence for the mnemic theory. Even if acquired characters are transmitted, it does not follow that the mnemic theory is true. And he gives no positive reasons for supposing it true, except those drawn from the above rather vague analogy. But surely, when we reflect on what is meant by saying that memory operates in forming habits, the analogy breaks down. The cause of my present automatic actions when I play the piano is the fact that I performed certain acts of memory in the past; if, then, we are to explain heredity in terms of memory and habit, we must find some entity which performed the necessary acts of memory in the past. But what entity?

Professor Ward sees this difficulty. He says that it is "meaningless to talk of memory unless we are prepared to refer it to a subject that remembers" (p. 55). But in this lecture he does not tell us what that subject is. All he tells us is that the mnemic theory cannot be true, unless we hold with Leibniz and Spinoza that "all individual things are animated" (p. 56); and such reasons as he gives here for thinking that it cannot be true both that there are some inanimate things in the universe, and that the inheritance of organic things from one another is a kind of memory, do not seem very conclusive.

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